

TABLE OF CONTENTS

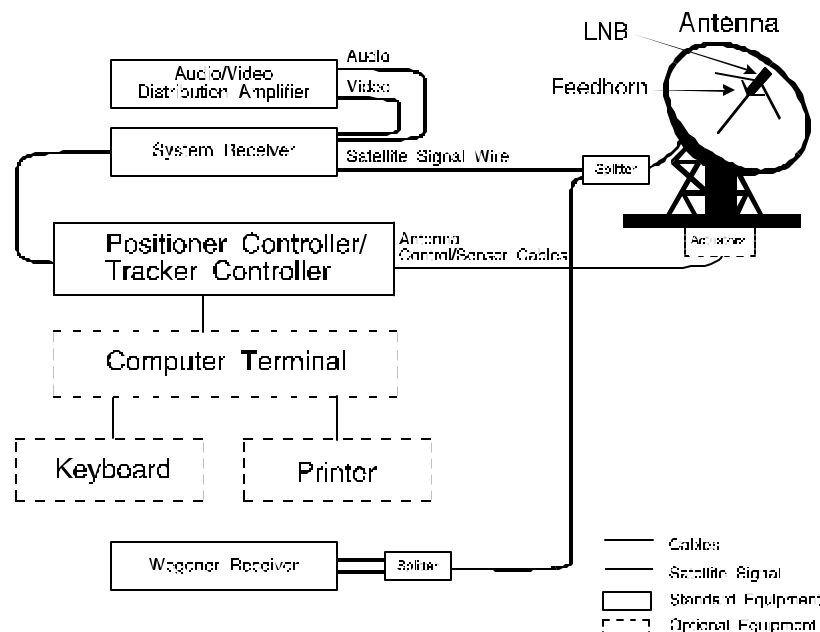
5 POSITIONERS/TRACKERS	2
GENERAL INFORMATION.....	2
<i>Positioner Description.....</i>	<i>2</i>
<i>Tracker Description.....</i>	<i>3</i>
<i>Terms.....</i>	<i>4</i>
PACE MSP 200 MULTI-SATELLITE POSITIONER AND MANHATTAN SP 250 SATELLITE POSITIONER.....	8
<i>Features.....</i>	<i>8</i>
<i>Operation.....</i>	<i>14</i>
PANSAT AP-3000 AND AP-3000E ANTENNA POSITIONERS.....	33
<i>Features.....</i>	<i>34</i>
<i>Operation.....</i>	<i>36</i>
PANSAT AP-600 ANTENNA POSITIONER.....	42
<i>Features.....</i>	<i>43</i>
<i>Operations.....</i>	<i>46</i>
OTHER POSITIONERS/TRACKERS	50
<i>Houston Tracker III Antenna Positioner.....</i>	<i>50</i>
<i>Merrimac MS-1 Satellite Tracking Controller.....</i>	<i>50</i>

5 Positioners/Trackers

General Information

Positioners or trackers are required Television Receive Only (TVRO) system components if the system's antenna tracks more than a single geostationary satellite or if the geostationary satellite being tracked is in an inclined orbit. Positioners are used with polar mount antennas. Trackers are used with azimuth/elevation (Az/El) mount antennas. Figure 5.1 illustrates the location of the positioner/tracker controller within the TVRO system.

Figure 5.1, TVRO Tracking System



Positioner Description

The purpose of a positioner controller (positioner) is to move the system antenna from one visible, geostationary, equatorial-orbiting satellite to another. A positioner is used only with a polar mount antenna. A polar mount antenna can move from left to right or right to left within the travel limits of its mount. The antenna's angle of elevation cannot be changed because it is set and locked in place at the time the antenna is installed.

A TVRO positioning subsystem consists of:

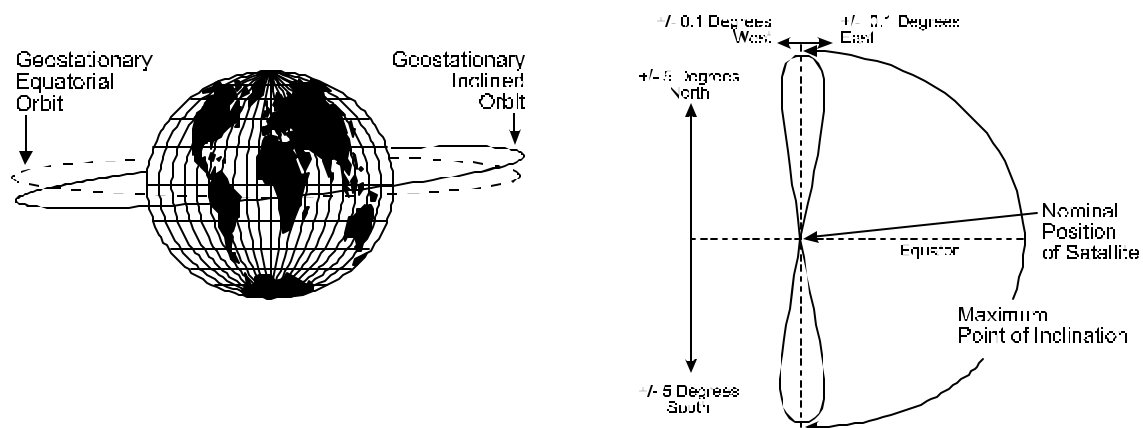
- A single antenna drive motor (actuator);
- Control/sensor cables; and
- A positioning controller.

All positioning and signal-transmission data for each satellite is entered into and stored in the memory of the positioning controller. On your command, the positioning controller turns on the antenna drive motor and moves the antenna to the selected satellite.

Tracker Description

The purpose of a tracker is to keep the system antenna pointed at a geostationary satellite that is in an inclined orbit. It is used only with an Az/El mount antenna. An inclined orbit satellite drifts ± 0.1 degrees within its longitudinal position (sideways movement) and drifts ± 5.0 degrees within its latitude position (vertical movement). From the ground, the movement of the satellite over a 24-hour period is a figure "8" as shown in Figure 5.2.

Figure 5.2, Inclined Orbit



Antenna's Tracking Pattern for Inclined-Orbit Satellite

As discussed in Chapter 3, Antennas, an Az/El mount antenna can move from left to right or right to left within the travel limits of its mount, and it can move up and down in elevation. This ability of the antenna to move both horizontally and vertically allows a satellite to be tracked throughout its entire 24-hour inclined orbit.

Without this tracking ability, signal strength would decline and could be lost entirely as the satellite moves towards its maximum points of inclination. An inclined orbit satellite's maximum signal reception occurs only twice during each

24-hour period, when the satellite's figure-8 pattern moves through its nominal position.

A TVRO tracking subsystem consists of:

- Two antenna drive motors (actuators);
- Control/sensor cables;
- A tracker controller;
- A computer terminal;
- A computer keyboard; and
- A printer.

All tracking and signal data for each satellite is entered into and stored in the central-processing unit (CPU) of the tracker controller. On your command, the tracker activates the antenna drive motors and moves the antenna to the selected satellite. As the satellite moves through its figure-8 pattern, the computer analyzes the strength of the signal being received and sends data to the tracking controller about how much to move the antenna vertically and horizontally to maintain maximum signal reception.

Terms

Acronyms, terms, and definitions useful in the following sections are listed here.

TERM	DEFINITION
AGC	Automatic Gain Control
Analog Signal	A signal transmitted on a continuously varying electromagnetic wave
Antenna	A solid or wire-mesh parabolic surface that reflects radio-frequency electromagnetic signals to a small point, called the focal point
Antenna Beamwidth	An angular width where the antenna sensitivity for receiving or transmitting signals falls to one-half its center sensitivity
Antenna G/T	A ratio of antenna gain to antenna noise temperature, pronounced "G over T". Measured as decibels/degree Kelvin (dB/K)
Antenna Gain	An antenna's ability to amplify an incoming signal. It is measured in units of decibels (dB)
Antenna Mount	The main support for an antenna reflector. One of three types: fixed, polar, or Azimuth/Elevation (Az/El)

TERM	DEFINITION
Aperture	The diameter of a parabolic antenna (dish) that intercepts the incoming satellite signal.
Bit Error Checking (BEC)	A method for checking a binary data stream for bit errors, sometimes called Viterbi Forward Error Checking (FEC)
Bit Error Rate (BER)	A measure of the accuracy of digital demodulation or decoding.
Bit Rate	The speed of digital transmission measured in bits per second.
Block Downconverter (BDC)	An electronic device that reduces a signal frequency to a lower frequency range, and then passes the signal into RG-11 coaxial cable running to the system receiver
BNC	A cable connector type
Cassegrain Focus	A focal point reached after two reflections: the antenna surface, and a second surface
Edge of Coverage	The limit of a defined service area, typically 3 dB down from beam center, but it may be more. Reception is still possible beyond this line.
Equatorial Orbit	A satellite orbit that travels over the equator of the Earth
FEC	Forward Error Correction
Feedhorn	A device located at the focal point of the antenna that collects focused, concentrated signal and passes it through a waveguide to the first stage of electronic amplification
Focal Point	A point near an antenna where signal reflections from the antenna surfaces meet
Frequency	The number of complete oscillations per second of an electromagnetic wave. 1 cycle per second = 1 hertz (Hz) 1,000 cycles per second = 1 Kiloherztz (KHz) 1,000,000 cycles per second = 1 Megahertz (MHz) 1,000,000,000 cycles per second = 1 Gigahertz (GHz)
Frequency Reuse	A technique that uses the same frequency with different signal polarizations to transmit different programs that do not interfere with one another
Geo-Stationary Orbit	A satellite orbit that has the same period of revolution as the Earth's rotational period
Hertz (Hz)	The unit of frequency, one cycle per second.
Inclined Orbit	A satellite orbit that travels to the north and south of the Earth's equator
Ku-Band	RF signal frequencies in the range, 10.95 - 12.75 GHz

TERM	DEFINITION
LED	Light Emitting Diode
Left Hand Circular Polarization (LHCP)	A transmitted electromagnetic signal rotating in a clockwise direction.
Megahertz (MHz)	1 million hertz.
Noise Source	Any signal that interferes with the desired signal
Nonvolatile Computer Memory	Computer memory that retains its stored data when the computer is turned off
Pick-up Probe	An electronic sensing device that converts RF electromagnetic signal into a varying electric current at the input to the Low-Noise Block Downconverter (LNB)
Polarity Controller	A disc (usually teflon) that directs a circularly polarized signal down the passage of a feedhorn to the pick-up probe
Polarization	The angle at which an electromagnetic wave signal is oscillating. Polarization is usually either linear or circular. If linear, the signal may be either horizontally or vertically polarized. If circular, the signal may be either left or right circularly polarized.
Positioner	A device used to move the TVRO antenna from one visible, geostationary, equatorial-orbiting satellite to another. A positioner is used only with a polar mount antenna.
Prime Focus	A focal point reached after one reflection from an antenna's surface
Right hand Circular Polarized (RHCP)	A transmitted electromagnetic signal rotating in a counterclockwise direction.
SCART Cable	An electrical cable connecting a positioner/tracker to a system receiver, enabling automatic transfer of satellite tracking data from the receiver to the positioner/tracker
Solar Outage	The loss of signal caused by the sun passing through the receiving antenna's beam.
Sparkles	A popular term for video noise seen as very small flashes of light on a monitor or television screen.
Tracker	A device used to keep the system antenna pointed at a geostationary satellite that has assumed an inclined orbit. It is used only with an azimuth/elevation (AZ/El) mount antenna.

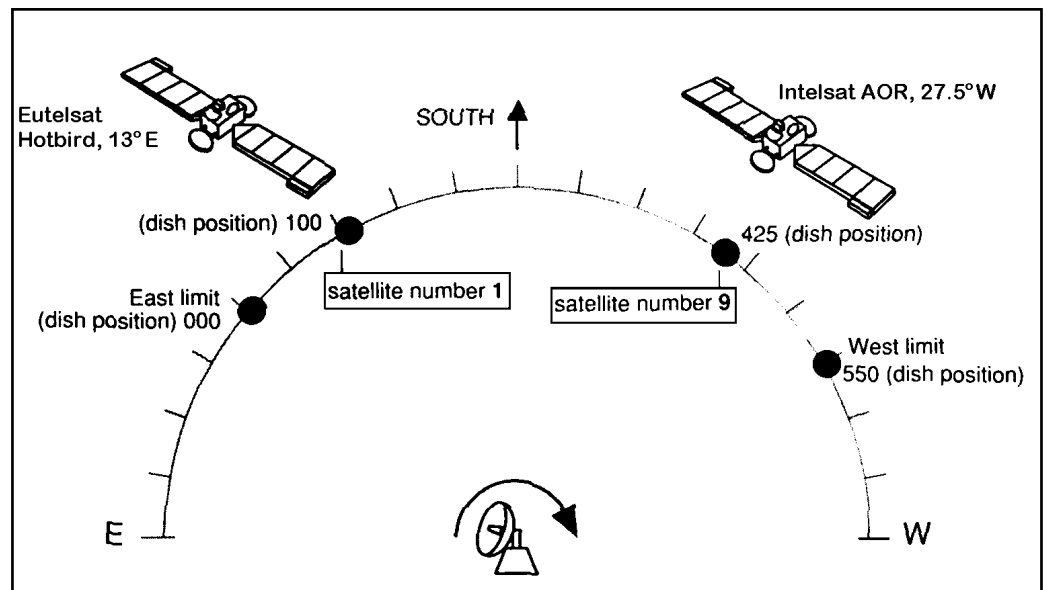
TERM	DEFINITION
Waveguide	A carefully machined metal passageway, through which the RF signal from the feedhorn passes to the first stage of electronic amplification
Waveguide Flange	The projecting collar on the rear end of a feedhorn. It bolts directly to the projecting collar on the front end of the low noise amplifier.

PACE MSP 200 Multi-Satellite Positioner and MANHATTAN SP 250 Satellite Positioner

This section discusses the operation of two satellite positioner models: the Pace MSP 200 Multi-Satellite Positioner and the Manhattan SP 250 Satellite Positioner. A satellite positioner allows a motorized satellite antenna to move from one satellite to another. It therefore allows you to receive programs relayed by more than one satellite. You set up the antenna positioner by lining up the antenna with each satellite in which you are interested, and then set a satellite number for each one. Once you have done this, the antenna moves easily to the correct position when required.

Figure 5.3 shows a sample case using two satellites. The movement of the antenna must have east and west limits, which you need to set up first. You then set each satellite number at a 3-digit antenna position, which shows the arc that the antenna has moved from the east limit. The east limit is always at antenna position 000. The east limit is always at antenna position 000.

Figure 5.3, Two-Satellite Positioning



Features

A cable connects the antenna positioner to the actuator arm of the antenna. There are two common types of actuator: the reed type and the optical (photo-interrupter) type. The Pace MSP 200 and the Manhattan SP 250 function with both types.

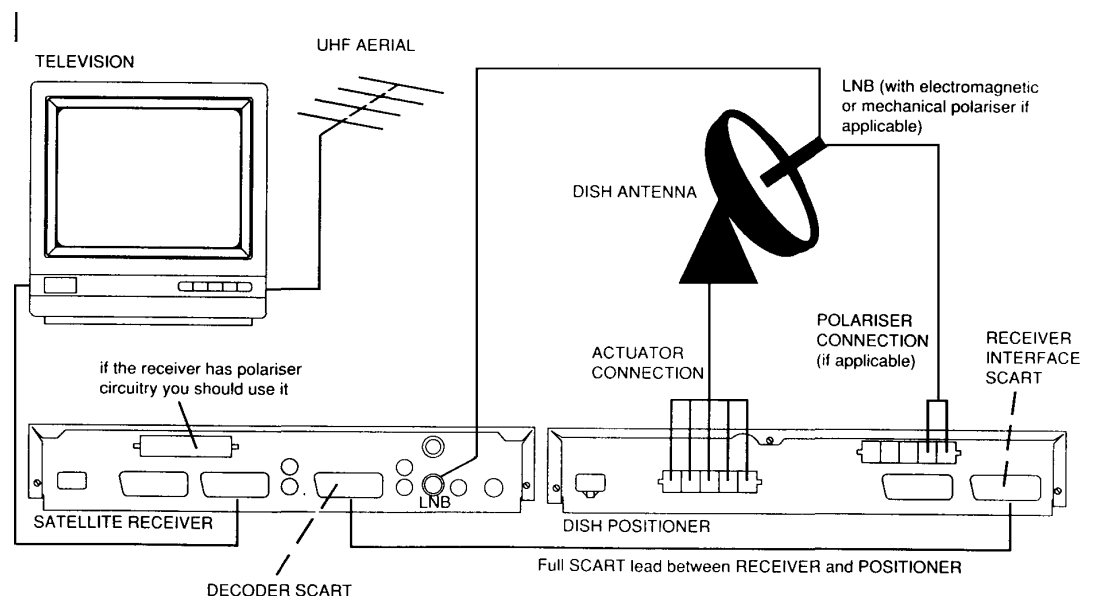
It is recommended that you connect the positioner to a compatible satellite receiver by a full SCART lead. This simplifies operation because the antenna moves automatically to the correct position when you select a program at your

receiver. The positioner responds to information it receives through the SCART lead connected to the receiver, and the receiver can receive information through the SCART lead from the positioner. By exchanging information, both units can operate in an optimum manner..

Polarizer Circuitry (positioner with polarizer control only)

Figure 5.4 shows system connections between the antenna and positioner. The positioner has a rear panel connector and contains circuitry to drive an electromagnetic or mechanical polarizer within the low-noise block downconverter (LNB). It is an advantage for the LNB on a moveable antenna to have one of these types of polarizers. The adjustable polarizer compensates for “polarization offset”, which occurs when signals reach the LNB from satellites in different parts of the sky

Figure 5.4, System Connections



If your satellite receiver has its own polarizer circuitry, use that circuitry to drive the polarizer. The positioner provides polarizer control for receivers that do not have their own polarizer circuitry.

At the positioner, you can set polarization values. These compensate for polarization offset and result in a better picture on your TV or monitor. Satellite programs are transmitted either horizontally or vertically polarized (H or V). Note the following information about polarization values:

- The values you enter at the positioner are different for horizontal and vertical polarizations;
- The values depend on the direction in which your antenna is pointing (different directions for different satellites); and

- If your antenna has an electromagnetic polarizer, the values you enter may depend upon the program frequency; that is, they may vary from program to program.

Positioner Operational Modes (Overview)

The positioner can be in **standby** mode or in one of three operational modes: **normal**, **program**, and **set limits**. There is a front panel light for each mode.

The positioner goes into **normal** mode when it comes out of standby. In **normal** mode, you can move the antenna by using the positioner handset to select a satellite number. The satellite number is displayed on the front panel of the positioner.

Before you can do this, however, you must set up the satellite numbers at the positioner. You do this in **program** mode. In this mode you hold down the **EAST** or **WEST** to move the antenna to align it with a satellite. The front panel displays the current antenna position for reception from this satellite. You save this position by giving it a satellite number. The procedure is then repeated for other satellites to be used.

During installation, you must first limit the movement of the dish by setting an east limit and a west limit. These limits are set up in the **set limits** mode. Refer to the *TVRO Installation Manual* for details on this procedure.

Positioner Configurations

The way you enter polarization values into either the Pace MSP 200 or the Manhattan SP 250 positioner depends upon its configuration. There are 3 available configurations. The correct configuration depends on the type of receiver your site uses and the settings you have made for the receiver's LNB. The positioner uses information passed through the SCART cable from the receiver. This information is sent at the time a program is selected at the receiver or when a new program is stored. The configurations use different kinds of information, as follows:

- Configuration 1 – Satellite number and polarization (H or V);
- Configuration 2 – Satellite number only; or
- Configuration 3 – Program number only.

The proper configuration to be selected is shown in Table 5.1.

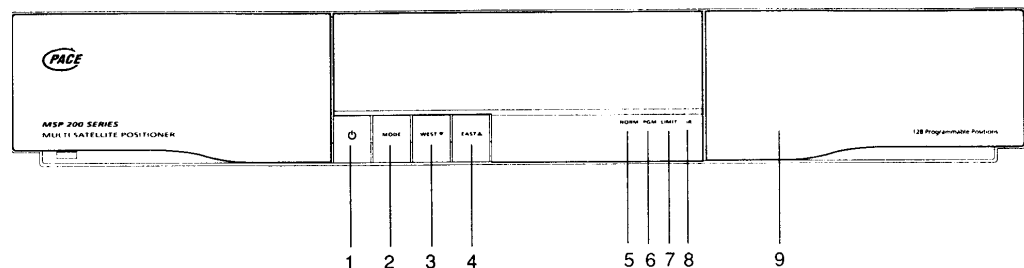
TABLE 5.1, POSITIONER CONFIGURATIONS

RECEIVER	POSITIONER WITH POLARIZER CONTROL	POSITIONER WITHOUT POLARIZER CONTROL
MSS series with "Positioner Pol." On	Configuration 1 (factory-set configuration)	Cannot be used
MSS series with "Positioner Pol." Off	Configuration 2	Configuration 2 (factory-set configuration)
PSR/PRD 800/900 series, MRD 950/960 series	Configuration 2	Configuration 2 (factory-set configuration)
A receiver not connected by a SCART cable to positioner	Configuration 2	Configuration 2 (factory-set configuration)
Early receiver, such as Pace 9000, 9200, MRD920	Configuration 3	Configuration 3

Front Panel Overview

Figure 5.5 shows the front panel of the Pace MSP 200 positioner. The numbers on the figure refer to the button names in the figure legend. Similar buttons are found on the Manhattan SP 250 positioner.

Figure 5.5, Positioner Front Panel



The functions associated with the front panel buttons are described in Table 5.2.

TABLE 5.2, FRONT PANEL BUTTON FUNCTIONS

IN NORMAL MODE:	
[EAST σ] or [WEST τ]	Steps through the satellite numbers one by one
[MODE]	Held down: Shows the current antenna position
[MODE] and [EAST σ]	Puts the positioner into Stage A of program Mode

IN PROGRAM MODE:	
NOTE: The buttons function as described below. If you use the handset to change the polarization information, you must then use the handset to complete any operations in program mode.	
IN STAGE A (MOVING TO POSITION):	
[MODE]	<ul style="list-style-type: none"> - Puts the positioner into set limits mode, if pressed first after entering program mode. - Puts the positioner into normal mode, if any other buttons have been pressed since entering program mode.
[EAST σ] or [WEST τ]	Moves the antenna east or west to a position between the east and west limits
[⌚]	Puts the positioner into Stage B of program mode
IN STAGE B (SETTING THE SATELLITE NUMBER):	
[EAST σ] or [WEST τ]	Changes the satellite number
[⌚]	Stores the displayed satellite number at the current antenna position, and returns the positioner to Stage A of program mode
[MODE]	Puts the positioner into normal mode
IN SET LIMITS MODE:	
[EAST σ] or [WEST τ]	Moves the antenna eastwards or westwards
[⌚]	Stores the east and west limits
[MODE]	<ul style="list-style-type: none"> - Puts the positioner into normal mode. If you have stored a new east limit, existing antenna positions are then recalculated. - When you reset both limits, press [MODE] immediately to save any existing satellite numbers.

Remote Control Handset Overview

In addition to the positioner front panel buttons, a remote control handset can perform operational functions. Figure 5.6 shows the operational buttons of the remote control handset.

Figure 5.6, Remote Control Handset



These operational functions are summarized in Table 5.3. This summary lists the main functions only.

TABLE 5.3, REMOTE CONTROL HANDSET FUNCTIONS

IN NORMAL MODE:	
[P—] and/or 0-9 keys	Selects the satellite number
σ or τ	Steps through the satellite numbers one by one
[MODE], then [1]	Puts the positioner into program mode
[MODE], then [2]	Puts the positioner into set limits mode
*[H/V]	Switches polarization between horizontal and vertical
*[NORM]	Restores the polarization to its setting when normal mode was first entered
[STATUS]	Held down: Displays the current antenna position
[EAST] or [WEST]	Press briefly while the antenna is stationary: Puts the positioner into program mode. The antenna then moves east or west, if you hold the key down. Press briefly while the antenna is moving: Stops the antenna and puts the positioner into program mode. To return to normal mode and restart the movement, press [NORM].
IN PROGRAM MODE:	
<i>In Stage A (moving to position and setting the polarization value):</i>	
[EAST] or [WEST]	Moves the antenna east or west to an antenna position between the east and west limits
*[POL]	Displays the current polarization value

*[H/V]	Switches polarization between horizontal and vertical
* σ or τ	Steps through the polarization values
[NORM]	Returns the positioner to normal mode without storing any changes
[STORE]	Puts the positioner into Stage B of program mode
<i>In Stage B (setting the satellite number):</i>	
[P—] and/or 0-9 keys	Selects the satellite number
σ or τ	Steps through the satellite numbers one by one
[STORE]	Stores the displayed satellite number (*and the polarization value(s) set in Stage A) at the current antenna position. Then the positioner is returned to Stage A of program mode.
[NORM]	Returns the positioner to normal mode without storing any changes
IN SET LIMITS MODE:	
[EAST] or [WEST]	Moves the antenna eastwards or westwards
[STORE]	Stores the limits. After storing the second limit, the positioner is returned to normal mode.
[NORM]	If one limit has been changed: Returns the positioner to normal mode and saves any satellite numbers (*and polarization values) that have been previously stored.
[MODE]	If both limits have been changed: Returns the positioner to normal mode and saves any satellite numbers (*and polarization values) that have been previously stored (provided you press it immediately).

* These functions are applicable only to positioners with polarizer control.

Operation



Because some of the installation procedures may need to be repeated, they are described in this manual as well as in the *TVRO Installation Manual*. The following installation procedures that may need repeating and are included here are as follows:

- Putting the positioner into and out of **standby**;
- Changing the configuration selection;
- Selecting satellite numbers;
- Adjusting the east and west limits;
- Setting up satellite numbers and polarization values (positioner with polarizer control);

- Setting up satellite numbers (positioner without polarizer control);
- Operating the positioner in **normal** mode;
- Changing the antenna position of a satellite number;
- Deleting a satellite number;
- Recovering satellite numbers after a power failure;
- Recovering satellite number after an “Err” message;
- Clearing the positioner’s memory; and
- Warning messages.

Putting the Positioner into and out of Standby

When the positioner is first switched on, it goes into **standby** mode, indicated by a dash on the front panel display of the positioner. To bring it out of **standby** and into **normal** mode, do one of the following options:



- Press  on the handset;
- Press [P--] and/or number keys on the handset to select a satellite number; or
- Press  on the front panel of the positioner.

If a receiver that is connected to the positioner by a SCART cable is brought out of standby, the positioner is also brought out of standby at the same time.

4

Whenever the positioner comes out of standby, the antenna may move. It depends upon where the antenna was when the positioner went into standby.



To put the positioner into standby, first make sure the positioner is in **normal** mode. Then do one of the following options:

- Press  on the handset., which also works if the positioner is in Stage A of **program** mode; or
- Press  on the front panel of the positioner.

If the positioner is in **normal** mode, it also goes into **standby** when an attached receiver goes into standby (except early receivers such as the Pace 9000, 9200, and MRD920).

Changing the Configuration Selection

If you need to change the positioner's configuration selection, follow the steps below before you connect the positioner to other equipment:

1. Make sure the AC power cord is detached from the AC source, but is plugged into the rear panel of the positioner.
2. Hold down both the  button and **EAST** σ on the positioner front panel. At the same time, plug in the AC power cord to apply power to the positioner.
3. Release the  button and **EAST** σ when a flashing number appears on the front panel display. This number is the current configuration.
4. Press the appropriate number key (1, 2, or 3) on the handset for the configuration you want.
5. Press [STORE].

The positioner stores the new configuration and goes into **standby**. Even if the positioner is switched off at the AC power source, it remains in the configuration you have selected.

Selecting Satellite Numbers

When you select a satellite number in **normal** or **program** mode, you can use the σ or τ to step through the numbers one by one, or you can use [P--] and the number keys shown in Table 5.4.

TABLE 5.4, KEYS FOR ENTERING SATELLITE NUMBER

SATELLITE NUMBER	ACTION
1 TO 9	Press the appropriate number key
10 TO 99	Press [P--] once, then press the two appropriate number keys
100 TO 128	Press [P--] twice to show "1-- " on the front panel display, then press the two appropriate number keys to complete the satellite number

Adjusting the East and West Limits

It is probable that you have already set the east and west limits to the movement of the antenna when the positioner was originally installed. During normal operation, you may want to change or adjust the east and west limits to new values. For example, when a new satellite is launched, you might want to change one or both of these limits. After the adjustment of east and west limits is finished, all satellite numbers that you have set up are to be preserved and their new antenna positions are to be recalculated.

For information on setting the east and west limits during installation, refer to the appropriate section of the *TVRO Installation Guide*.

To adjust only one limit of the antenna movement, follow the steps below:

1. On either the remote control handset or the front panel of the positioner, press **MODE** then **2**. This puts the positioner into **set limits** mode.
2. To adjust only one limit, press and hold either **EAST** or **WEST**. This moves the antenna to the position of the new limit.
3. Press **STORE** to save the new setting. The front panel display shows “**L1 Set 000**”.
4. Press **NORM** to return the positioner to **normal** mode.

Any satellite numbers you have already set up are preserved. If you have set up a new **east** limit, their antenna positions are recalculated. This recalculated position is not needed if you have adjusted the west limit, because antenna positions are always calculated from the east limit **000**.

To adjust both limits of the antenna movement, follow the steps below:

1. On either the remote control handset or the front panel of the positioner, press **MODE**, then **2**. This puts the positioner into **set limits** mode.
2. Press **EAST** or **WEST** to move the antenna to the new **east** limit.
3. Press **STORE** to save the new setting. The display shows “**L1 Set 000**” to indicate that the new **L1** limit has been saved.
4. Press **EAST** or **WEST** to move the antenna to the new **west** limit.
5. Press **STORE** to save the new setting. The display shows “**L2 Set 000**” to indicate that the new **L2** limit has been saved.
6. Press **MODE** immediately to preserve all the existing satellite numbers. If you do not wish to preserve them, do not press [MODE].

4

At any time you can abandon the limit setting mode by pressing **NORM**. This returns the positioner to **normal** mode, and the antenna moves to the position of the last satellite number you chose.

Setting up Satellite Numbers and Polarization Values (positioner with polarizer control)

Overview

In **program** mode, you set up one or more satellite numbers for each satellite from which you plan to receive signals. You also set up polarization values to improve the picture quality. You use your receiver, as well as your positioner, so that you can see on a TV or monitor when you have found the proper satellite and picture quality. What you do depends upon the configuration that you have chosen for you positioner:

Configuration 1

You set 1 satellite number per satellite and store 2 polarization values with it (one for horizontal and one for vertical polarization). At the receiver, all the programs from a particular satellite have the same satellite number. You can set 64 satellite numbers in all (maximum number for MSS-series receivers).

Configuration 2

You set 2 satellite numbers per satellite. You store a vertical polarization value with the first number and a horizontal polarization value with the second number. To do this you need to select just 2 programs (per satellite) with the receiver (one for horizontal; one for vertical). At the receiver, all the vertical polarization programs from the satellite have the first satellite number, and all the horizontal polarization programs have the second satellite number. You can set 64 satellite number in all for MSS-series receivers and 128 in all for PRD/PSR 800/900 series receivers.

Configuration 3

You set 2 satellite numbers per satellite, as for Configuration 2, but you need to repeat the set-up procedure for every program from each satellite. You can set 128 satellite numbers in all.

4	If you have an electromagnetic polarizer on your antenna, you may need to set up more satellite numbers per satellite than described above. You might do this if you notice poor picture quality for some programs from a particular satellite, but good picture quality for other programs from the same satellite. Refer to Step 7 in the procedure for Configuration 3 for more details.
---	---

Your receiver may be preset for programs from various satellites. If the preset programs are for only 1 satellite, you use the Tuning Menu described below to tune into and store programs from other satellites.

It is recommended that you attach your positioner to your receiver by a full SCART cable. The instructions to follow assume that you have done this. If you want to use your positioner without making this connection, set it to Configuration 2. You can then still set up satellite numbers as described below, but you must use your positioner handset to operate the positioner in **normal** mode.

When the positioner is connected to the receiver by a SCART cable, the receiver sends information down the SCART cable to the positioner whenever you select a program at the receiver. The information is used by the positioner to move the antenna to its correct position and to select the stored polarization value.

STEP 1: Putting the Positioner into Program Mode

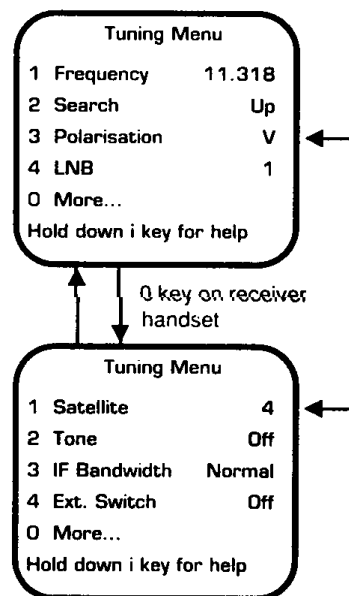
If the positioner is in **standby**, press  to put it into **normal** mode.

If the positioner is in **normal** mode (**NORM** light on front panel of positioner is **ON**), press **MODE** then **1**. This puts the positioner into **Stage A** of **program** mode (**PGM** light is **ON**). The current antenna position is displayed on the positioner's front panel (for example, 050).

STEP 2: Selecting a Program and Setting its Satellite Number and Polarization at the Receiver

Consult your receiver user manual for its Tuning Menu. A typical Tuning Menu for MSS-series receivers is shown in Figure 5.7.

Figure 5.7, Sample Tuning Menu



If programs from the desired satellite have already been preset in your receiver, follow the steps below:

1. At the receiver, key in the number of a vertical polarization program from the desired satellite.
2. Display the receiver's tuning menu.

If your receiver has not been preset for the desired program and satellite, proceed as follows:

1. At the receiver, set the frequency, LNB and polarization (V) of a vertical program coming from the desired satellite.
2. Select the "Satellite" option and set the satellite number to the required value (something different from any of the preset satellites).

3. Store this program at the required program number (being careful to avoid overwriting any preset programs).
4. Redisplay the receiver's Tuning Menu.

STEP 3: Finding the Satellite

1. At the positioner, press [POL] on the positioner handset to display the positioner's current polarization value (**V** or **H** followed by a number).
2. If the polarization does not agree with that shown in the Tuning Menu, press [H/V] on the positioner handset to switch the polarization.
3. At the positioner, press [EAST] or [WEST] on the positioner handset until you can see the program you have selected on your TV or monitor (look for its logo). The positioner's front panel display shows the current antenna position (for example, 105). If "End" is displayed, the antenna has reached the east or west limit.

4	At this stage, the picture may be of poor quality because you need to adjust the polarization information, described in Step 4.
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STEP 4: Setting the Vertical Polarization Value

1. At the positioner, press σ or τ on the positioner handset to display the positioner's polarization value again.
2. Press σ or τ until you see the best quality picture on the TV or monitor.

The next step depends upon the choice of positioner configuration:

- For Configuration 1, see step 5a for Configuration 1;
- For Configuration 2, skip to Step 5b for Configuration 2; or
- For Configuration 3, skip to Step 5c for Configuration 3.

STEP 5a, b, c: Setting the Horizontal Polarization Value and Storing the Satellite Number(s)

Step 5a for Configuration 1:

1. At the receiver, select a horizontal polarization program from the same satellite as the vertical polarization program in Step 2 above.
2. Display this program's Tuning Menu and make sure that its satellite number is the same as it was for the vertical polarization program in Step 2. If it is necessary to change the satellite number, be sure to store it.
3. At the positioner, press [H/V] on the positioner handset to change the polarization value to be the same as that on the program's Tuning Menu.
4. Press σ or τ until you see the best quality picture on the TV or monitor.

5. Press [STORE] on the positioner handset. This puts the positioner into **Stage B** of **program** mode. The positioner's front panel shows a flashing satellite number.
6. Press [P--] and/or number keys to change this satellite number to be the same as that shown in the Tuning Menu of the receiver.
7. Press [STORE] to save this satellite number and the two polarization values at the current antenna position.
8. If you wish to return to **normal** mode, press [NORM]. If you do this before you press [STORE], any changes you may have made are cancelled and abandoned.
9. At the receiver, make sure that all programs from this satellite have the same satellite number.

Proceed to Step 6.

Step 5b for Configuration 2:

At the positioner, press [STORE] on the positioner handset. This puts the positioner into **Stage B** of **program** mode. The positioner's front panel now displays a flashing satellite number.

1. Press the [P--] and/or number keys to change this satellite number to be the same as that shown in the receiver's Tuning Menu.
2. Press [STORE] to save this satellite number and the vertical polarization value at the current antenna position. The positioner returns to **Stage A** of **program** mode.
3. At the receiver, select a horizontal program from the same satellite.
4. Make sure that its satellite number is different from that for the vertical program you chose in Step 2, and store this satellite number at the receiver.

∫	You could set and store this number as "30 plus the vertical number". For example, if 4 is the "vertical" satellite number, then you would set 34 as the "horizontal" satellite number for that satellite.
---	--

5. At the positioner, press [H/V] on the positioner handset to change the polarization displayed on the positioner's front panel to be the same as that displayed on the receiver's Tuning Menu.
6. Press σ or τ until you see the best quality picture on the TV or Monitor.
7. Press [STORE]. This puts the positioner into **Stage B** of **program** mode. The positioner's front panel now displays a flashing satellite number.
8. Press [P--] and/or number keys to change this satellite number to be the same as that shown in the receiver's Tuning Menu.
9. Press [STORE] to save this satellite number and the horizontal polarization value at the current antenna position.

You have now stored at the same antenna position, two different satellite numbers (one for vertical polarization programs and one for horizontal polarization programs).

If you want to return the positioner to **normal** mode, press [NORM]. Note that if you do this before you press [STORE], any changes you may have made are cancelled and abandoned.

At the receiver, make sure that each vertical polarization program from this satellite has the “vertical” satellite number, and that each horizontal polarization program has the “horizontal” satellite number. Use the Tuning Menu for each program to do this.

Proceed to Step 6.

Step 5c for Configuration 3:

1. At the positioner, press [STORE] on the positioner handset.
This puts the positioner into **Stage B** of **program** mode. The positioner’s front panel now displays a flashing satellite number.
2. Press [P--] and/or number keys to change this satellite number if you wish.
3. Press [STORE] to save this satellite number and the vertical polarization value at the current antenna position.

4. At the receiver, select another vertical polarization program from the same satellite.

5. At the positioner, press [STORE] on the positioner handset twice.

You have now stored this second vertical polarization program at the same satellite number and with the same vertical polarization value as you did for the first program. Repeat this process for all the vertical polarization programs you are interested in from this satellite. When you have stored all the vertical polarization programs with this vertical polarization value, the positioner may be put into **Stage A** of **program** mode by pressing [STORE] once. You can now repeat this procedure for the horizontal polarization programs as follows:

1. At the receiver, select a horizontal polarization program from the *same* satellite.
2. At the positioner, press [H/V] on the positioner handset to change the polarization to be the same as that shown on the receiver’s Tuning Menu.
3. Press σ or τ until you see the best quality picture on the TV or monitor.
4. Press [STORE].

This puts the positioner into **Stage B** of **program** mode. The positioner’s front panel display now shows a flashing satellite number.

5. Press [P--] and/or number keys to change this satellite number to a value *different* from the number you have stored for the vertical polarization programs.

∫	You could set and store this number as “30 plus the vertical number”. For example, if 4 is the “vertical” satellite number, then you would set 34 as the “horizontal” satellite number for that satellite.
---	--

6. Press [STORE] to save this satellite number and the horizontal polarization value at the current antenna position.
7. At the receiver, select another horizontal polarization program from the same satellite.
8. At the positioner, press [STORE] on the positioner handset twice.

You have now stored this second horizontal polarization program at the same satellite number and with the same horizontal polarization value as you did for the first program. Repeat this process for all the horizontal polarization programs you are interested in from this satellite.

4	You have now stored, at the same antenna position, all of the programs you are interested in at two different satellite numbers, one for the vertical polarization programs, and the other for the horizontal polarization programs.
---	--

If you wish to return the positioner to **normal** mode, press [NORM]. Note that if you do this before pressing [STORE], any changes you may have made are cancelled and abandoned.

Proceed to Step 6.

STEP 6: Repeating the Process for Other Satellites

When you have pressed [STORE] at the end of Step 5, the positioner returns to **Stage A** of **program** mode. Steps 2 to 5 may now be repeated for programs from a different satellite. Remember that different satellites must not have the same satellite number.

STEP 7: Additional Satellite Numbers at the Same Antenna Position

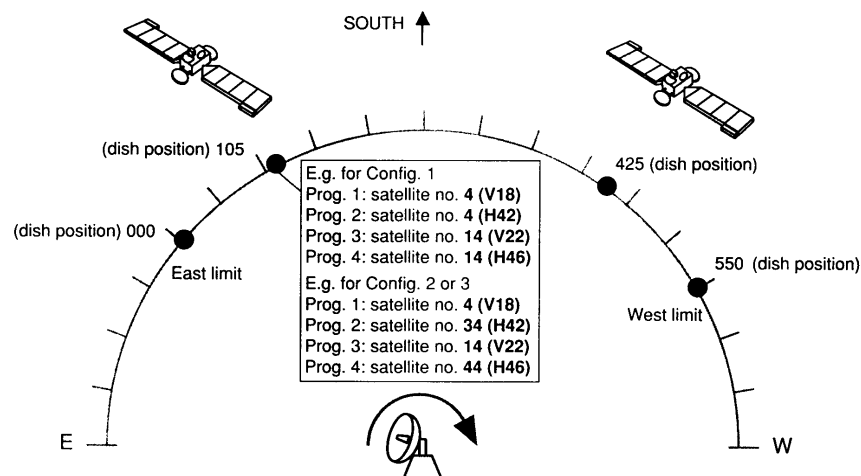
If you have an electromagnetic polarizer on your LNB, you may need to set up additional satellite numbers for a particular satellite to get the best picture for each program. This may be necessary if there is a wide range of frequencies for programs from that satellite. The operation of electromagnetic polarizers depends somewhat on the frequency of the program. For each satellite, you can have several different polarization values, stored with different satellite numbers, all at the same antenna position.

For the satellite requiring this procedure, follow Steps 2, 4, and 5 of **program** mode, making sure that the satellite numbers you choose are identical on the receiver program Tuning Menu and on the positioner’s front panel display when you store them.

You cannot set up more than 128 position numbers in all (64 in all if the attached receiver is in the MSS series).

Figure 5.8 shows two examples: one for a positioner in Configuration 1, and the other for a positioner in Configuration 2 or 3.

Figure 5.8, Positioners



For Configuration 1, there are two satellite numbers (4 and 14) at the same antenna position. Both a vertical and horizontal polarization value can be stored with one satellite number. Program 1 (vertical polarization) and program 2 (horizontal polarization) can have the same satellite number (4). Program 3 is also a vertical polarization program, but its frequency happens to be much higher or lower than that for program 1. Program 3 gives the best picture if its vertical polarization value is set at V22, and it must therefore be given a different satellite number (14). For the same reason, program 4 may need to have a different horizontal polarization value (H46) from that used for program 2.

For Configuration 2 or 3, only one polarization value can be stored with each satellite number. All four programs in the example must have a different satellite number.

It is important to remember that there may be many programs that have the same satellite number. They can share a satellite number provided the polarization values stored with that satellite number give a good picture for that program.

Setting up Satellite Numbers (Positioners without Polarizer Control)

Overview

In **program** mode, you set up one satellite number for each satellite from which you want to receive signals. You use your receiver as well as your positioner, so that you can see on your TV or monitor when you have found the required satellite.

Configuration 2

You select just one program per satellite at the receiver in order to set up the satellite number at the positioner. At the receiver all programs from a particular satellite have the same satellite number. You can set 64 satellite numbers in all for MSS-series receivers and 128 in all for PRD/PSR 800/900 series receivers.

Configuration 3

You set only one satellite number per satellite. At the positioner, you need to repeat the setting up procedure for every program from each satellite. You can set 128 satellite numbers in all.


Your receiver may be preset for programs from various satellites. If the preset programs are for only one satellite, you use the Tuning Menu described below to tune into and store programs from other satellites.

It is recommended that you attach your positioner to your receiver by a full SCART cable. The instructions to follow assume that you have done this. If you want to use your positioner without making this connection, set it to Configuration 2. You can then still set up satellite numbers as described below, but you must use your positioner handset to operate the positioner in **normal** mode.

When the positioner is connected to the receiver by a SCART cable, the receiver sends information down the SCART cable to the positioner whenever you select a program at the receiver. The information is used by the positioner to move the antenna to its correct position and to select the stored polarization value.

STEP 1: Putting the Positioner into Program Mode

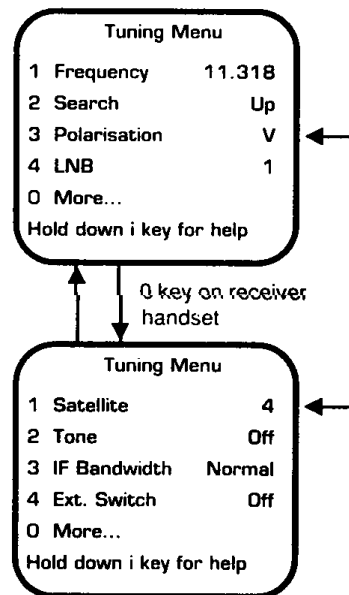
If the positioner is in **standby**, press  to put it into **normal** mode.

If the positioner is in **normal** mode (**NORM** light on front panel of positioner is **ON**), press **MODE** then . This puts the positioner into **Stage A** of **program** mode (**PGM** light is **ON**). The current antenna position is displayed on the positioner's front panel (for example, 050).

STEP 2: Selecting a Program and Setting its Satellite Number and Polarization at the Receiver

Consult your receiver user manual for its Tuning Menu. A typical Tuning Menu for MSS-series receivers is shown in Figure 5.9.

Figure 5.9, Tuning Menu



If programs from the desired satellite have already been preset in your receiver, follow the steps below:

1. At the receiver, key in the number of a vertical polarization program from the desired satellite.
2. Display the receiver's tuning menu.

If your receiver has not been preset for the desired program and satellite, proceed as follows:

1. At the receiver, set the frequency, LNB and polarization of a program coming from the desired satellite.
2. Select the "Satellite" option and set the satellite number to the required value (something different from any of the preset satellites).
3. Store this program at the required program number (being careful to avoid overwriting any preset programs).
4. Redisplay the receiver's Tuning Menu.

STEP 3: Finding the Satellite

At the positioner, press [EAST] or [WEST] on the positioner handset until you can see the program you have selected on your TV or monitor (look for its logo). The positioner's front panel display shows the current antenna position (for example, 105). If "End" is displayed, the antenna has reached the east or west limit.

STEP 4: Setting and Storing the Satellite Number

1. At the positioner, press [STORE] on the positioner handset. This puts the positioner into **Stage B** of **program** mode. The positioner's front panel display shows a flashing satellite number.
2. Press [P--] and/or number keys to change this satellite number to be the same as that shown in the Tuning Menu of the receiver. For Configuration 3, set a satellite number of your choice.
3. Press [STORE] to save this satellite at the current antenna position. The positioner then returns to **Stage A** of **program** mode.
4. If you wish to return to **normal** mode, press [NORM]. If you do this before you press [STORE], any changes you may have made are cancelled and abandoned.

STEP 5: Setting the Satellite Number for Other Programs from the Same Satellite

Step 5 for Configuration 2:

At the receiver, make sure that each program for this satellite had the same satellite number. To do this, display the Tuning Menu for each program. Change and store the satellite number as needed.

Step 5 for Configuration 3:

Repeat Steps 2 and 4 for all the programs you are interested in from this satellite. Make sure you set the same satellite number for each one.

STEP 6: Repeating the Process for Other Satellites

When you have pressed [STORE] at the end of Step 4, the positioner returns to **Stage A** of **program** mode. Steps 2 to 5 may now be repeated for programs from a different satellite, if you wish. Remember that different satellites must not have the same satellite number.

Operating the Positioner in Normal Mode

Once you have set the east and west limits and entered the satellite number for the satellites you are interested in, the positioner is simple to operate in **normal** mode (the **NORM** light is **ON**).

When the positioner is in **normal** mode, the most recently selected satellite number is shown in the front panel display. If the antenna is currently not at the antenna position corresponding to the displayed satellite number, it moves until it is.

In **normal** mode, when the antenna is moving toward a new position, the positioner's front panel display "counts down" like a clock. This does not occur if there is less than 2 seconds to go before the new position is reached. The "count" eventually reaches zero when the antenna reaches the new position. This "count" is not the same thing as the antenna position, and should not be confused

with it. When the “count” has reached zero, the display returns to the satellite number.

Using Your Satellite Receiver Handset (If So Equipped)

If you have connected the antenna positioner to your satellite receiver by a SCART cable and have stored the satellite numbers at the appropriate antenna positions, then you can operate the entire system using your receiver handset. At the receiver, select the desired program as you would normally. If your antenna is not currently pointing in the correct direction to receive the program you chose, the positioner automatically moves the antenna until it is.

Using Your Antenna Positioner Handset

You can use the positioner handset to move the antenna when the positioner is in **normal** mode. You must use this method if you have a receiver that is not connected to the positioner by a SCART cable.

Use [P--] and/or the number keys on the positioner handset to key in the required satellite number. If your antenna is not currently at the position corresponding to this satellite number, it moves to the required position.

Interpreting “Out” Positions

If you have changed the east or west limits and preserved existing satellite numbers, it could happen that the positions of some satellite numbers now fall outside the new range of movement of the antenna. If you select the satellite number of one of these, the front panel displays “OUT” and the antenna will not move. These “out” positions have not been lost or deleted. You can reach them again if you readjust the east or west limits appropriately.

Interpreting “Not Set” Positions

If you key in a satellite number that has not been set up and stored, the antenna will not move. The words “Not” and then “SET” are displayed on the front panel of the positioner. If your receiver is connected to the positioner by a SCART cable, the same message is displayed if you select a program at the receiver.

Displaying the Current Antenna Position

To see the current antenna position, hold down [STATUS] on the remote handset, or hold down [MODE] on the front panel of the positioner. The current antenna position is displayed on the front panel of the positioner.

Stopping the Antenna

To stop a moving antenna during the “count down” to a satellite position, briefly press [EAST] or [WEST] on the remote handset, or press the **MODE** and **EAST** σ buttons on the front panel of the positioner. This puts the positioner into **program** mode. However, you must make sure you do not hold down the [EAST] or [WEST]. If you do, the antenna starts to move again.

To restart movement toward the same position, press [NORM] on the remote handset, or **MODE** on the front panel of the positioner. This puts the positioner back into **normal** mode.

Displaying Program Numbers

If your positioner is in Configuration 3 and connected to the receiver by a SCART cable, you can set it to display the program number (rather than the satellite number) in **normal** mode.

Press [MODE] followed by [9] on the remote handset to put the positioner into this “display mode”. To restore the positioner to its normal display, press [MODE] then [9] again.

Changing the Antenna Position of a Satellite Number

If you have a satellite that you are no longer using, you can re-use the satellite number for a different satellite. You do this by pointing the antenna at a new satellite while the old satellite number is in the positioner front panel display. Follow the steps below:

1. With the positioner in **normal** mode, select the desired satellite number (the antenna may move).
2. Press and hold [EAST] or [WEST] on the remote handset to put the positioner into **program** mode and to move the antenna to the new position.
3. Press [STORE] twice to save the existing satellite number at the new antenna position.

At the receiver, make sure that each program from the new satellite has the correct satellite number at its Tuning Menu.

4	For Configuration 3, you must repeat the entire set up and storage procedure at the positioner for every program
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4	For positioners with polarizer control, you may also need to adjust the polarization values at the positioner. The satellite signals are now coming from a different point in the sky and may have different polarization values.
---	---

Deleting a Satellite Number

To delete a satellite number you no longer wish to use, follow the steps below:

1. With the positioner in **normal** mode, select the satellite number you wish to delete (the antenna may move).
2. Make sure the programs that you can see from this satellite number are no longer wanted by checking them on your TV or monitor.

3. Press [MODE] then [1] on the remote handset to put the positioner into **program** mode.
4. Press [MODE] then [3]. The display on the front panel of the positioner alternates between displaying the satellite number and the word “DEL”.
5. Press [STORE] on the remote handset to delete the satellite number. The positioner returns to **normal** mode, and the deleted satellite number followed by “not set” is displayed.

4	If you wish to abandon the procedure, press [NORM] instead of [STORE] in Step 5.
----------	--

If you wish to delete all the satellite number at once, reset the east and west limits at their current positions, but do not press [MODE] to preserve the satellite numbers.

Recovering Satellite Numbers after a Power Failure

Every time the antenna comes to rest, the positioner stores information about the antenna's position in its internal memory. If there is a power failure or the positioner is switched off while the antenna is stationary, all the stored positions are preserved in memory when power is restored.

If a power failure occurs while the antenna is moving, the stored positions is lost unless the recovery procedure described below is carried out. For this procedure to work, the following conditions must be met:

- Satellite number 1 must have been set up and stored before the power failure;
- Satellite number 1 must be located between the current east and west limits (that is, it must not be “out”);
- You must be able to remember which satellite had satellite number 1; and
- For Configurations 2 and 3, and for positioners with polarizer control, you must also be able to remember which polarization (H or V) was stored with satellite number 1.

When power is restored after the power failure, all three lights on the front panel of the positioner is on, and “**SET**” and “**UP1**” (set up satellite number 1) flash on the front panel display. The positioner is now in a **recovery** mode. Follow the steps below:

1. At your receiver, select a program from the satellite that had the satellite number 1 (for Configurations 1 and 2, you can display the program's Tuning Menu to check this). For Configurations 2 and 3, make sure you select a program with the correct polarization, if your positioner has polarization control.
2. Press [EAST] or [WEST] on the positioner remote handset to move the antenna until you can see the selected program on your TV or monitor.

3. Press [STORE] on the positioner remote handset.

The positioner then functions as it did before the power failure. All of the previously stored satellite numbers are restored.

Recovering Satellite Numbers after an “Err” Message

Follow the procedure below when an “Err” message is displayed on the front panel of the positioner:

1. If the antenna was moving when the “Err” message is displayed, check to see if any of the antenna actuator wires have become disconnected.
2. If this is so, switch off the positioner at the AC power source, re-attach the disconnected wires, and reapply AC power again.
3. When the “SET UP1” message is displayed on the front panel display, complete the procedure described in the preceding section to recover any satellite numbers you have set up.

4	If the wires are still firmly attached, the “Err” message means the antenna is stuck or has reached its mechanical limit of travel.
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Clearing the Positioner’s Memory

If necessary, you can reset the positioner to the condition it was in when you installed it. All satellite numbers, limits, etc. that you have previously set become “not set”. Follow the steps below:

1. Put the positioner into **normal** mode.
2. On the remote handset, quickly press [P--], then [STORE], then [STATUS].

The front panel lights light up for several seconds while the positioner resets itself.

Interpreting Warning Messages

A number of warning messages can be displayed on the front panel of the positioner. The meanings of these messages are given in Table 5.5.

TABLE 5.5, WARNING MESSAGES

OUT	The antenna position of this satellite falls outside the current east and west limits.
End	<p>You have tried to move the antenna past the east or west limit (in program mode).</p> <p>Note: After “End”, the antenna position of the limit is displayed. If the antenna has moved quickly to the west limit, it can pass this point slightly. In this case, an antenna position slightly greater than expected is displayed. This does not affect the functioning of the positioner.</p>
SET UP1	The positioner is in “recovery” mode.

Err	<ul style="list-style-type: none"> - The antenna is stuck or has reached its mechanical limit of travel. - Alternatively, one or more of the actuator wires may have become disconnected.
The following error messages indicate that there are problems with the positioner's memory. If these messages occur, contact your system administrator.	
000	If this message is displayed when the positioner is powered up and before going into standby mode.
LE1	If this message appears persistently
Er1	If this message appears persistently

PANSAT AP-3000 and AP-3000E Antenna Positioners

The Pansat AP-3000 and AP-3000E antenna positioner uses steerable RF antennas to access multi-satellite broadcast video and audio programs. The features of these positioners are:

- Microprocessor controlled circuitry;
- 99 satellite programmability;
- Large LED alphanumeric display;
- Easy to use parental lock-out;
- Programmable over-travel limits;
- Non-volatile memory;
- Polarity and skew control function;
- Compatible with Pansat BR3000 receiver without using interface cable;
- Optional IR remote control; and
- Actuator re-synchronization function for easy reset.

Specifications for the Pansat AP-3000 and Ap-3000E positioners are given in Table 5.6.

TABLE 5.6, SPECIFICATIONS

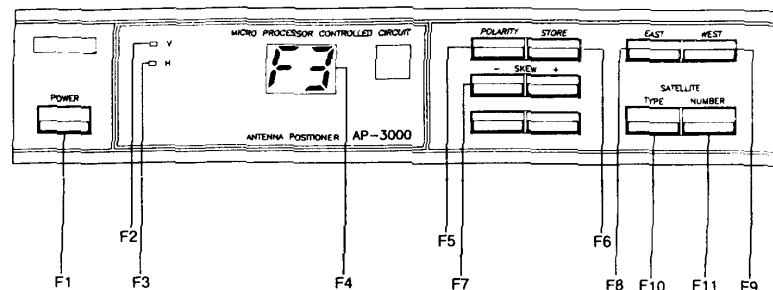
	AP-3000	AP-3000A
Power mains	AC 117V 60Hz	AC 220V 50Hz
Motor supply voltage	30 VDC 3A	SAME
Sensor type	Reed, Hall effect	SAME
Unit dimension	WxHxD = 10¾" x 2½" x 10"	SAME
Unit weight	8 lb.	SAME

Features

Front Panel Indicators

Figure 5.10 shows the controls and indicators of the front panel of the Pansat positioner.

Figure 5.10, Front Panel View



The meanings of the controls and indicators on the Pansat positioner front panel are:

F1 Power Switch

Press F1 to turn power on. Press again to turn power off.

F2 Vertical Polarity Indicator

This indicator turns on when the receiver has selected polarity "V".

F3 Horizontal Polarity Indicator

This indicator turns on when the receiver has selected polarity "H".

F4 Position LED Display

This LED display shows the selected satellite type and numbers.

F5 Polarity Control

This control is used when changing polarization from Vertical to Horizontal or horizontal to vertical. The setting of this control depends upon the format of the particular satellite being received.

F6 STORE Switch

This button is used to preset the antenna limits and to store the satellite location.

F7 Skew Control

This adjustment allows fine-tuning of the received signal polarization. This control may need to be adjusted when changing from satellite to satellite.

F8 EAST Switch

This button controls movement of the antenna toward the eastward direction in the sky.

F9 WEST Switch

This button controls movement of the antenna toward the westward direction in the sky.

F10 TYPE Switch

This button selects the type of satellite being received.

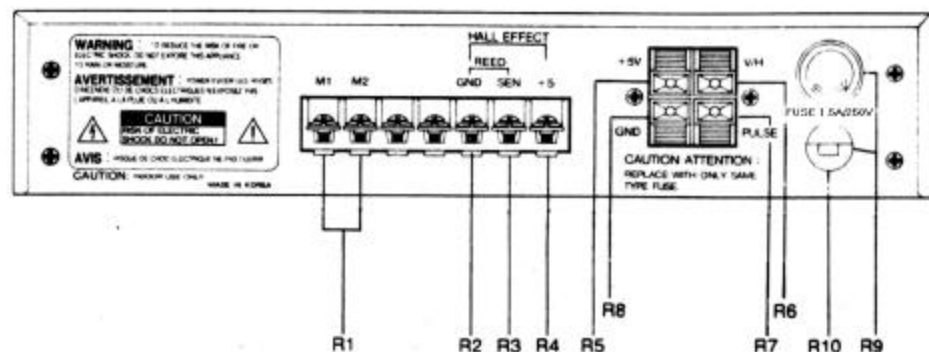
F11 NUMBER Switch

This button selects the satellite number (1 through 9).

Rear Panel Connectors

Figure 5.11 shows the connections on the rear panel of the Pansat positioner.

Figure 5.11, Rear Panel View



The meanings of the connectors on the Pansat positioner rear panel are:

R1 M1, M2 Terminal

This terminal can be connected to the motor wires.

R2 GND Terminal

This terminal supplies a common ground for the reed-switch or hall-effect sensor of the actuator.

R3 SENSOR Terminal

The reed-switch or hall-effect sensor of the actuator is connected to this terminal.

R4 +5V Terminal

Power to the hall-effect sensor unit of the actuator is supplied from this terminal.

R5 +5V

This connector supplies power to the polarizer on the feedhorn.

R6 V/H Connector

This connector is for an external V/H switch, providing 0V or +12 VDC.

R7 Pulse

Motion pulses to the polarizer are provided from this connector.

R8 GND

A common ground for the polarizer and external V/H switch is supplied from this connector.

R9 Fuse

This is a fuse for the AC supply line. It must be replaced only with a 250V 1.5A fuse.

R10 Line Cord

Plug this cord into a 117 VAC, 60 Hz electrical outlet (AP-3000). For the AP-3000A, plug into a 220 VAC, 50 Hz electrical outlet.

Operation

In addition to the functions described above, only a few other operational procedures are necessary to operate the Pansat AP-3000 positioner. These functions include:

- On/Off control;
- Recalling satellites;
- Parental lock-out feature;
- Actuator re-synchronization; and
- Optional hand-held 3000I remote control.

Programming the Pansat AP-3000, 3000E Positioner

Important functions to be used in programming the AP-3000 positioner include:

- Clearing memory;
- Setting east and west limits; and
- Storing satellite locations.

Clearing Memory

Before using the AP-3000, it is important to clear the unit's memory by following the procedure below:

1. Press and hold **TYPE** and **NUMBER** simultaneously. While holding these buttons down, press and release **STORE**.
2. The display begins a countdown from **9** to **1**.
3. When the display reaches "**1**", the symbol "**EL**" begins to flash on the display. This indicates that all memory has been erased, and the positioner is ready to program the EAST LIMIT of antenna movement.

4	If you want to cancel or abandon this procedure, you can do so by releasing TYPE and NUMBER before the countdown to " EL " is completed.
---	---

Setting the East and West Limits

East and west limits must be set before attempting to store any satellite positions. If this is not done, the unit does not accept any programming. To set the east and west limits, follow the steps below:

1. When the letters "**EL**" (for EAST LIMIT) are flashing on the positioner front panel display, press **EAST** to rotate the antenna just beyond the most eastern satellite that you want to receive.
2. Press **STORE**. This saves the EAST limit, and the antenna does not rotate beyond this point.
3. The letters "**WL**" (for WEST LIMIT) are flashing in the front panel display. Press **WEST** to rotate the antenna just beyond the most western satellite that you want to receive.
4. Press **STORE**. Two dashes "--" are displayed on the front panel of the positioner. This saves the WEST limit, and the antenna will not rotate beyond this point.

4	If the East and West limits are set at the same position, the antenna will not move in either direction.
---	--

Storing Satellite Locations

This procedure must be followed when first storing satellite locations during installation. However, it is a regular procedure to be followed during normal operations. To store satellite locations, follow the steps below:

1. Locate the satellite to be stored by manually moving the antenna. Use **EAST** or **WEST** to do this.
2. Press **TYPE** repeatedly until the code for the satellite type you want is displayed on the front panel of the positioner. Examples of the meanings of the codes are given in Table 5.7.

Table 5.7, Satellite Type

CODE	SATELLITE	CODE	SATELLITE
A	ANIK	D	COMSTAR
E	EXTRA SATELLITES	F	SATCOM
G	GALAXY	K	Ku Band
M	MORELOS	O	OTHERS
S	SPACENET	T	TELSTAR
W	WESTAR		

3. Press **NUMBER** repeatedly until the satellite number you want (**1 – 9**) is displayed on the front panel of the positioner.
4. Press **STORE** when the satellite type and number are correct. If you delay pressing **STORE** for longer than three seconds, the display disappears. It is necessary to repeat steps 1 through 4 again to re-enter the satellite location.
5. All satellites may be stored by repeating steps 1 through 4.

4	If the AP-3000 memory area for storing satellites is full (up to 99 satellites), any attempt to store additional satellites causes the letters “MF” (memory full) to be displayed on the front panel of the positioner.
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Using the On/Off Control

Use **POWER** to turn the AP-3000 on and off.

Recalling Satellites

To recall a satellite that has been stored, follow the steps below:

1. Press **TYPE** repeatedly until the satellite type you want is displayed on the front panel of the positioner.
2. Press **NUMBER** repeatedly until the satellite number you want is displayed on the front panel of the positioner.

3. The AP-3000 pauses for 3 seconds, and then the antenna rotates to the selected satellite. As the antenna moves through its arc, a vertical bar is displayed on the front panel of the positioner. This bar indicates in which direction the antenna is moving. When the rotation of the antenna is complete and the satellite has been found, the positioner displays the selected satellite code and number on the front panel. All satellites can be recalled in this way.

4	The motion of the antenna can be stopped at any time by pressing TYPE or NUMBER , or by pressing POWER . In this way, you can change the antenna direction or its destination without waiting. If you press POWER , however, the antenna stops and then the unit turns off.
---	---

Using the Parental Lock-Out Feature

The AP-3000 positioner may be used to lock the antenna in a specific position. To do this, follow the steps below:

1. Select an antenna position. This may either be on or off a satellite position.
2. Press **TYPE** repeatedly until the letter “E” is displayed on the front panel of the positioner.
3. Press **NUMBER** repeatedly until the number “9” is displayed on the front panel of the positioner.
4. Press **STORE**. This must be done within 3 seconds after the satellite number “9” was entered. The letters “PL” flash on the front panel display. The antenna is now locked in the last position.
5. To unlock the parental lock-out, repeat steps 2 through 4. The front panel display shows “UL” to indicate that the antenna is now unlocked.

Resynchronizing the Actuator

This feature is used when:

- Repairing or replacing the actuator or defective sensor wires;
- Reconnecting loose actuator wires or clamps; or
- Correcting any problem that causes the antenna position to be off by the same amount for every satellite.

The actuator resynchronization feature allows you to adjust the actuator so that the antenna matches the receiver's currently stored satellite positions. This saves you the task of reprogramming the receiver satellite positions. To do this, follow the steps below:

1. Press **POWER** to turn the AP-3000 on.
2. Press **POLARITY**, **SKEW+**, **SKEW-**, and **STORE** simultaneously. The letters “**RS**” are displayed in the front panel of the positioner.
3. Using the **EAST** or **WEST** buttons, tune the picture received on your TV or monitor to achieve best picture quality on any programmed satellite.
4. Press **TYPE** and **NUMBER** to identify the programmed satellite properly. When you are sure of the correct satellite and program, press **STORE**. The AP-3000 turns off and all satellites are resynchronized.

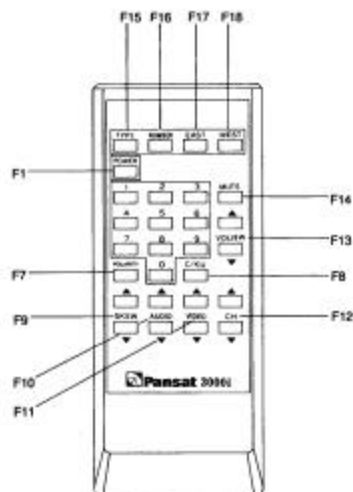
4

To cancel the resynchronization function, unplug the AP-3000 from the AC power supply

Using the Optional Hand-Held 3000I Remote Control

An optional feature of the Pansat AP-3000 positioner is the 3000I hand-held remote control. Figure 5.12 shows the control buttons for this option.

Figure 5.12, 3000I Hand-Held Remote Control



In Figure 5.12, the buttons marked F15, F16, F17, F18, F1, F7, and F9 are buttons that operate the AP-3000 positioner. All the other buttons are used to operate the Pansat BR3000 satellite receiver.

East and west antenna limits must be programmed on the Ap-3000 before attempting to operate with the 3000I remote control.

Troubleshooting the Pansat AP-3000 Positioners

Trouble-shooting the Pansat AP-3000 and AP-3000E antenna positioners involves interpreting error displays on the front panel of the positioner. Table 5.8 summarizes these error displays:

TABLE 5.8, TROUBLESHOOTING THE PANSAT POSITIONERS

SYMPTOM	SOLUTION
AE (Actuator Error) displayed	<ul style="list-style-type: none"> - Check connection of the two motor wires. - Make sure the gauge of the motor wires is not too small (14 gauge motor wires are recommended). - Check operation of actuator motor.
DE (Data Error) displays intermittently	<ul style="list-style-type: none"> - Check to see if unwanted or unauthorized movement of the antenna is occurring.
DE displayed continuously	<ul style="list-style-type: none"> - If positioner serial number is less than 4000, unplug AC power and replug again to clear display. - Check reed sensor (if applicable). - Check distance between magnet and reed sensor. - Check for loose or open connection of either sensor wire. - Make sure pulse and ground sensor wires are not touching each other. - Make sure sensor wire gauge is adequate (20 gauge shielded is recommended). - Check tightness of connection at terminal at rear panel of positioner. - Positioner control may be defective. Contact your system administrator.

PANSAT AP-600 Antenna Positioner

The Pansat AP-600 antenna positioner uses steerable RF antennas to access multi-satellite broadcast video and audio programs. The features of this positioner are:

- Microprocessor controlled circuitry;
- Power failure protection circuitry;
- 100 satellite programmability;
- 4 digit / 7 segment LED display;
- Parental lock/unlock feature;
- Programmable over-travel limits;
- Non-volatile memory;
- Built-in overload protection; and
- Actuator re-synchronization function for easy reset.

Specifications for the Pansat AP-600 positioner are given in Table 5.9.

TABLE 5.9, SPECIFICATIONS

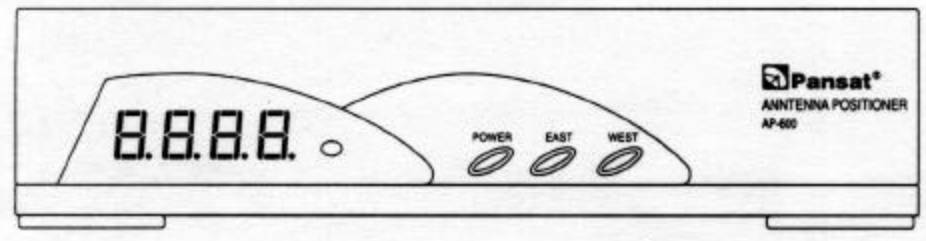
	AP-600
Power Main	AC 110/220-240V, 50/60Hz
Motor supply voltage	36 VDC, 3A Max
Sensor type	Reed Switch / Hall Effect
Unit dimension	WxHxD = 29 x 6.5 x 20 cm
Unit weight	3.15 Kg.

Features

Front Panel Indicators

Figure 5.13 shows the controls and indicators of the front panel of the Pansat AP-600 positioner.

Figure 5.13, AP-600 Front Panel View



The meanings of the controls and indicators on the AP-600 positioner front panel are:

- <POWER> Power On/Off;
- <EAST> To move antenna east (downward);
- <WEST> To move antenna west (upward);
- Available first digit name character:

A, C, d, E, F, H, L, n, P, t, U; and

- Available second digit name number:

1, 2, 3, 4, 5, 6, 7, 8, 9.

Table 5.10 shows the basic functions of the LED display on the AP-600 front panel.

TABLE 5.10, AP-600 LED FUNCTIONS

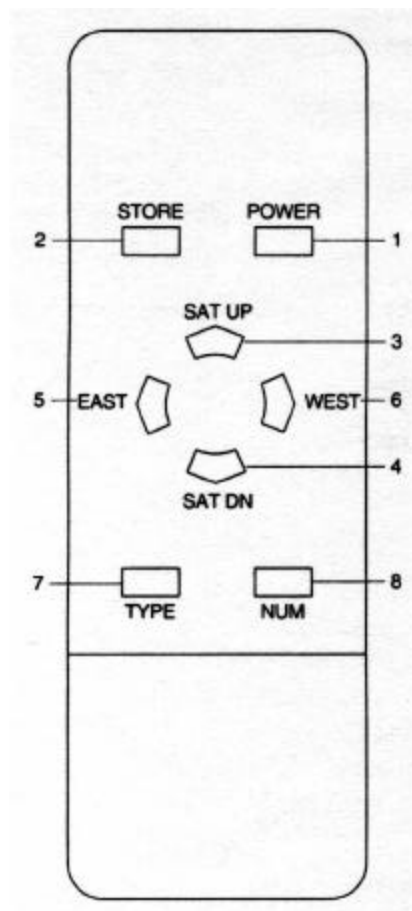
LED Functions	Display
Programmed position Name	Ex <A1>
Position counter	Ex <1234>
East limit	<EL>
West limit	
Position is over East limit	<EL-->
Position is over West limit	<--UL>
Position is Locked	<Lock>

LED Functions	Display
Position is Unlocked	<UnLc>
Resynchronization procedure	<Alin>
Delete programmed position procedure	<(--)>
No return pulse error	<Err1>
Clear all memory	<---->

Remote Control

Figure 5.14 shows the control buttons and indicators on the AP-600 hand-held, remote control box.

Figure 5.14, AP-600 Hand-Held Remote Control



The meanings of the controls and indicators on the AP-600 positioner front panel are:

POWER

Power On/Off

STORE

Store position. Initiate or terminate special function.

SAT UP

Call programmed position upward

SAT DN

Call programmed position downward

EAST

To move antenna east (downward)

WEST

To move antenna west (upward)

TYPE

Position naming first digit (alphabet)

NUM

Position naming second digit (numeric)

Rear Panel Connections

Figure 5.15 shows the connections on the rear panel of the AP-600 positioner.

Figure 5.15, AP-600 Rear Panel View



The meanings of the connectors on the AP-600 positioner rear panel are:

M1, M2 Terminals

These terminals should be connected to the actuator motor wires.

GND Terminal

This terminal supplies a common ground for the reed-switch or hall-effect sensor of the actuator.

SEN (Sensor) Terminal

This terminal is used to connect the sensor (pulse) wire from the actuator.

+5V Terminal

DC power only to the hall-effect sensor unit of the actuator is supplied from this terminal.

Line Cord

Plug into the correct electrical outlet.

AC 110/220-240V Switch

This switch is used to select 110V or 220-240V.

Operations

In addition to the functions described above, only a few other operational procedures are necessary to operate the Pansat AP-600 positioner. These functions include:

- Programming the positioner;
- Recalling satellites;
- Erasing satellite positions;
- Parental lock feature; and
- Actuator re-synchronization.

Programming the Pansat AP-600 Positioner

Important functions to be used in programming the AP-600 positioner include:

- Clearing memory;
- Setting east and west limits; and
- Storing satellite locations.

Clearing Memory

Before using the AP-600, it is important to clear the unit's memory by following the procedure below:

1. Press and hold **POWER** and **EAST** on front panel simultaneously, until the display counts down from "-10" to "-1" and then shows "----".
2. After three seconds, "EL" will begin to flash, which means all memory has been cleared and you are ready to set the east limit.

4

If you want to cancel or abandon this procedure, you can do so by releasing **POWER** and **EAST** before the countdown to "EL" is completed.

Setting the East and West Limits

East and west limits must be set before attempting to store any satellite positions. If this is not done, the unit does not accept any programming. To set the east and west limits, perform the following steps:

1. When the letters "EL" (for EAST LIMIT) are flashing on the positioner front panel display, press **EAST** to rotate the antenna just beyond the most eastern satellite that you want to receive.
2. Press **STORE** for three seconds, until "UL" starts flashing. This saves the EAST limit, and the antenna does not rotate beyond this point. The position number will be 1000.
3. The letters "UL" (for WEST LIMIT) are flashing in the front panel display. Press **WEST** to rotate the antenna just beyond the most western satellite that you want to receive.
4. Press **STORE** for three seconds, until two dashes "--" are displayed on the front panel of the positioner. This saves the WEST limit, and the antenna will not rotate beyond this point.

4

If the East and West limits are set at the same position, the antenna will not move in either direction. In this case, the memory should be cleared, and you should reset the East and West limits.

Storing Satellite Locations

This procedure must be followed when first storing satellite locations during installation. However, it is a regular procedure to be followed during normal operations. To store satellite locations, follow the steps below:

1. Locate the satellite to be stored by manually moving the antenna. Use **EAST** or **WEST** to do this.
2. Press the **TYPE** button repeatedly until the code for the satellite type you want is displayed on the front panel of the positioner.
3. Press the **NUM** button repeatedly until the satellite number you want (1 – 9) is displayed on the front panel of the positioner.
4. Press **STORE** for three seconds when the satellite type and number are correct. If you delay pressing **STORE** for longer than three seconds, the display disappears. It is necessary to repeat steps 1 through 4 again to re-enter the satellite location.
5. All satellites may be stored by repeating steps 1 through 4.

4	If the AP-600 memory area for storing satellites is full (up to 100 satellites), any attempt to store additional satellites causes the letters “MF” (memory full) to be displayed on the front panel of the positioner.
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Recall the Satellite

To recall a satellite that has been stored, follow the steps below:

1. Press the **SAT UP** or **SAT DN** buttons repeatedly until the satellite type you want is displayed on the front panel of the positioner.
2. The AP-600 pauses for 3 seconds, and then the antenna rotates to the selected satellite. As the antenna moves through its arc, a vertical bar is displayed on the front panel of the positioner. This bar indicates in which direction the antenna is moving. When the rotation of the antenna is complete and the satellite has been found, the positioner displays the selected satellite code and number on the front panel. All satellites can be recalled in this way.

4	The motion of the antenna can be stopped at any time by pressing TYPE or NUMBER , or by pressing POWER . In this way, you can change the antenna direction or its destination without waiting. If you press POWER , however, the antenna stops and then the unit turns off.
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Using the Parental Lock-Out Feature

The AP-600 positioner may be used to lock the antenna in a specific position. To do this, follow the steps below:

1. Select an antenna position. This may either be on or off a satellite position.
2. Press **TYPE** repeatedly until the letter "E" is displayed on the front panel of the positioner.
3. Press **NUMBER** repeatedly until the number "9" is displayed on the front panel of the positioner.
4. Press **STORE** for three seconds. This must be done within 3 seconds after the satellite number "9" was entered. The letters "LOCK" flash 2-3 times on the front panel display and then "--" appears. The antenna is now locked in the last position.
5. To unlock the parental lock-out, repeat steps 2 through 4. The front panel display flashes "UnLc" 2-3 times and then shows "--" to indicate that the antenna is now unlocked.

Resynchronizing the Actuator

This feature is used when:

- Repairing or replacing the actuator or defective sensor wires;
- Reconnecting loose actuator wires or clamps; and
- Correcting any problem that causes the antenna position to be off by the same amount for every satellite.

The actuator resynchronization feature allows you to adjust the actuator so that the antenna matches the receiver's currently stored satellite positions. This saves you the task of reprogramming the receiver satellite positions. To do this, follow the steps below:

1. Press the **TYPE** and **NUM** buttons until you have selected "E8".
2. Press **STORE** for three seconds until "ALin" flashes.
3. Using the **EAST** or **WEST** buttons, move the antenna to the desired satellite position.
4. Press **SAT UP** or **SAT DN** to select the programmed satellite properly. When you are sure of the correct satellite and program, press **STORE** for three seconds until "END" displays. The AP-600 turns off and all satellites are resynchronized.

4	To cancel the resynchronization function, unplug the AP-600 from the AC power supply
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Other Positioners/Trackers

Houston Tracker III Antenna Positioner

The Houston Tracker III antenna positioner is the primary positioner used in the American Republics.

Features

The Houston Tracker III antenna positioner has the following features:

- Up to 24 different satellites' geostationary positions can be programmed into its memory;
- Programmable travel limits;
- Full transient protection and surge protection;
- A self-contained 5 amp, 36V DC thermally-protected power supply; and
- Nonvolatile computer memory.

Merrimac MS-1 Satellite Tracking Controller

The Merrimac MS-1 satellite tracking controller is used to track an inclined orbit satellite.

Features

The Merrimac MS-1 satellite tracking controller consists of:

- Two antenna drive motors (actuators) and control/sensor cables;
- A tracker controller;
- A computer terminal;
- A computer keyboard; and
- A printer.